The use and usefulness of formative assessment materials: do they have an effect on student performance in final exams?

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Background  
Since 1992 have developed computer delivered learning materials  
- tutorial programs  
- self-assessment resources  
- Online mid semester mock exam  
Feedback on materials gave us  
- Formative developmental guidance  
- Suggestions of where to place effort  
These developments gave us insight into how we thought the materials were being used and how useful they were to students.

Researching these insights  
Setting the hypotheses  
¾ Does use of formative assessment resources have an impact on learning outcomes?  
Our initial research had shown us that  
¾ all resources not used by all students  
¾ Students using the resources claim great benefits from this use  
¾ use/non-use may be linked to learning outcomes but we could not demonstrate this

Self-assessment resources  
Self-assessment modules - SAMs  
- Designed on four levels of difficulty  
- re-use content; design of templates for re-use  
- eighteen SAMs in use  
Weekly quiz  
- offline; mcq style;  
Mid course exam  
- self-identify ‘at risk’ status  
- paper-based delivery; web-based marking; extensive feedback  
Students love them; use them for revision; for learning; to test themselves; to develop a comfort level with the content

Open-ended comments on formative resources  
“They test what you do and don’t know, but in a pressure-free environment.”  
“I feel that because it’s non-compulsory we have more freedom of choosing when to do them. This is good because everyone studies at a different pace.”  
“They made it fun being non-compulsory”

Perceived usefulness of formative items

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Use of formative resources

So we refined the research question to ask about one type of self-assessment resource

“Does the use of SAMs by students have any impact on their final exam mark?”

Methodology

Survey:
- with quantitative and qualitative questions

Handed out to:
- 457 students (77% response rate)
- 66% female (67% for total cohort)
- 77% in science-based degrees (81%)
- 54% taken biology in last year at school (50%)
- 88% school leavers (84%)
- final mean mark 64% with a range of 27-91% (64% with 27-94% range)

Survey group was representative of the entire cohort of students

Investigated:

- Did the non-users who became users improve their performance?
- How to measure this?
  - Look at position in their “cohort” and whether they moved
  - What measure to use?
  - Looked at a range of possibilities
    - Final exam; multi-choice; short answers

What did we look at?

Compared performance of students who used SAMS with those not using them
Controlled for ability
- For Semester 1 data – no significant effect
- For Semester 2 data - +ve effect; significant; of up to 3.96 marks for users compared with non-users of the same ability
- Just Science students (who also have a higher level of interest in biology), then the effect is 4.6 marks difference in Semester 2

Thoughts about the results…..

- Students show a transition effect in semester 1
  - Not yet working independently
  - Not yet understand how to use the resources
- Semester 2 shows difference
  - Users of SAMS are getting more marks in final exam
  - Science students are doing particularly well